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# SAFETY ELEMENT

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City planning Bakersfield
Emerg. relief "

Bakersfield, COMMUNITY DEVELOPMENT DEPARTMENT

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# SAFETY ELEMENT

## A. INTRODUCTION

The past planning practices of many communities often times failed to consider basic issues of safety from natural disasters-such as fires, floods, and earthquakes. In the 1970's the state legislature became alarmed about this and enacted a number of laws intended to increase the level of safety afforded to the people.

Two such laws were amendments to the California Government Code requiring all city and county General Plans to include a Seismic Safety Element (Section 65302 (f)) and a Safety Element (Section 65302.1)

This report complies with the intent of legislation requiring the Safety Element, defined as follows:

> A safety element for the protection of the community from fires and geologic hazards including features necessary for such protection as evacuation route, peak load water supply requirement, minimum road widths, clearance around structures, and geologic hazard mapping in areas of known geologic hazard.

It must be recognized, however, that state planning law in many instances calls for elements which duplicate or overlap each other. This report has been prepared in a manner to minimize duplication. In particular--

1. The Seismic Safety Element deals with geologic hazards; this Safety Element only references such policies.
2. The Conservation Element includes a section on flooding entitled "Hydraulic Forces of Water";

this Safety Element includes an update of that section as an amendment to the General Plan.

3. The Public Services and Facilities Element includes a Storm Drainage Plan; this Safety Element references and amends that plan.

4. The City already has an approved Emergency Plan; this Safety Element references that Plan.

B. SUMMARY OF RECOMMENDATIONS

Objective - To provide a reasonable degree of safety to the people of Bakersfield from disasters.

Recommendations:

1. Geologic Hazards

   (See the Seismic Safety Element)

2. Flooding Hazards

   a. The City should continue to manage activities within the Kern River Flood Plain to limit damage from flooding, including:

      - Flood Plain Zoning

      - Encouraging construction of additional levees.

   b. The City should continue implementation of Storm Drainage Plan through the Capital Improvements Program. The Storm Drainage plan is described in the Public Services and Facilities Element.

   c. The City should continue its participation in the National Flood Insurance Program including use of appropriate land use and development controls within designated flood prone areas.

3. Fire Protection

   a. The City and the County should work together to minimize or eliminate jurisdictional or service area overlap of fire stations within the greater Bakersfield area.

b. The City should institute a program to stimulate the extensive use of automatic sprinkler protection systems through:

- requiring sprinkler protection systems where redevelopment activity would occur.
- an ordinance requiring sprinkler protection in commercial and industrial uses of over a certain size and/or height.
- low-interest loans to finance sprinkler system installation in existing buildings.

c. Streets should continue to be designed so that movement of fire control equipment is not unduly impaired.

d. The Fire Department should continue to review site plans and set forth necessary requirements as conditions for approval.

4. Emergency Plans

a. The City should keep its Emergency Plan up-to-date and conduct periodic drills to assure its effectiveness.

C. Geologic Hazards

Geologic hazards which are of concern within the City of Bakersfield are dealt with by the Seismic Safety Element. Recommendations which address such gelogic hazards are organized under the following headings within the Seismic Safety Element:

1. Land Use Planning (pp. 12-14)
2. The Role of the Building Department (pp. 14-17)
3. Disaster Contingency Plans (p. 17)
4. Continuing Research (pp. 18-19)
5. Self-help (pp. 19-21)

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D. FLOODING HAZARDS

Bakersfield, located along the south bank of Kern River 16 miles downstream from the mouth of the Kern Canyon, has a history of flooding. The first flood was recorded in 1861. Since then, 18 other floods of varying magnitudes have occurred.

Two types of floods occur in the Bakersfield vicinity--one type from rainfall and the other from snow melt. Average annual precipitation ranges from about 5 inches on the valley floor to 45 inches in the head water regions, averaging about 16 inches over the entire drainage basin. Rain floods generally occur during the period of November through April. Snow melt floods generally occur from April through June.

1. Kern River Flood Plain

Major projects have been undertaken to prevent or minimize flooding. The Levee District was formed in May, 1928, and a levee about 4 miles in length was built paralleling the south bank of the river in the vicinity of Bakersfield, and one of 2½ miles in length was built on the north bank.

Isabella Dam and reservoir, with a storage capacity of 570,000 acre-feet of water, is the other flood prevention facility on the Kern River upstream from Bakersfield.

The dam, since its completion in 1954, by the Corp of Engineers, has greatly reduced the threat of flooding. Recognizing the possibility that flooding may still be anticipated, the Corps of Engineers designated two areas (flood plains) which may be anticipated to flood: 1) that which might

flood once every 100 years; and 2) that which may be inundated less frequently. However, both of these areas are much larger than the minimum channel through which the main flow of water could be carried. The flood control mechanisms set forth by the Corps of Engineers and the HUD National Flood Insurance Program are geared toward the 100 year event rather than more frequently anticipated floods (see Illustration I).

The Board of Reclamation is now in the process of designating a "Floodway" on the Kern River which will define that portion of the river channel through which the flood flows of the 100 year event could be accommodated. Such pending action will be more useful to the City for purposes of ensuring an acceptable level of flood protection than the areas previously designated by the Corps of Engineer. (Illustration II)

ILLUSTRATION I

## Flood Prone Areas

Intermediate regional flood

Standard project flood

Local flooding areas

ILLUSTRATION II

BOARD OF RECLAMATION "FLOODWAY"

(MAP NOT YET AVAILABLE--TO BE INSERTED AT A LATER DATE)

Even with the remote possibility of flooding it is still necessary to assure that only compatible land uses exist within the flood plain. The Zoning Regulations of the City of Bakersfield now include provisions for limiting uses within flood plain areas. The ordinance specifies two zones - "Flood Plain Primary" and "Flood Plain Secondary". "Flood Plain Primary" is defined as the stream bed and that portion of the flood plain through which the main flow of flood water is channeled. This main channel is coterminous with the designated floodway" to be adopted by the State Board of Reclamation. The "Flood Plain Secondary" now corresponds to the Corps of Engineers 100-year flood plain and will be defined more specifically by future studies.

It is now believed that sufficient measures have been taken, both structurally and through land use controls, to provide an acceptable level of flood protection from the Kern River.

2. Local Storm Run Off and Flooding

As undeveloped properties shift to urban uses and much of the land area is covered by streets, structures, parking lots, driveways and other impervious materials the volume of storm water runoff increases. In Bakersfield this results in what may be termed as local flooding, which is flooding not necessarily related to flooding from the Kern River.

Those portions of Bakersfield which would be inundated with such local flooding during the loo-year event are shown in Illustration I. These areas were designated by the U.S. Department of Housing and Urban Development (HUD) for purposes of implementing the National Flood Insurance Program. It should be recognized that these designated

flood hazard areas are subject to revision by HUD, upon submission of justifying technical data and information.

Facilities to accommodate storm drainage within the greater Bakersfield area are thoroughly described in the Public Facilities and Services Element (as amended) of the Bakersfield Area General Plan. It is important to note that the planned drainage system is generally designed to accommodate flows of the 10-year event; it would become far too expensive for the benefits derived to ultimately develop a local drainage system to accommodate the 100-year event.

3. National Flood Insurance Program

The National Flood Insurance Program provides for insurance against flooding within areas designated by HUD as "flood prone" (see Illustration I). In order for property owners to be eligible for such insurance the local jurisdiction must agree to participate in the program.

Participation is really a must. Buyers of properties within flood prone areas will not be eligible for loans or grants which may involve federal assistance or regulation unless the properties are insured against flood. This would even include loans from banks and local savings and loan institutions because they are insured by the federal government. On July 14, 1975, the City Council passed a resolution agreeing to participate in the Flood Insurance Program and to enact regulations necessary to

continue eligibility.

As a result of that action property owners within designated flood prone areas may now acquire flood insurance at subsidized rates. Within one-year HUD is scheduled to submit additional information to the City indicating the water surface elevation of floodwaters during the 100-year event. The City will then be obligated to initiate adequate land use control measures based upon such data; flood insurance for new development or substantial rehabilitation within the flood prone areas will then be based upon actuarial rates.

It is anticipated that land use controls will involve "Flood Proofing" of structures by raising building elevations.

4. Recommendations:

a. The City of Bakersfield should continue to manage activities within the Kern River Flood Plain to limit damage from flooding. Existing zoning regulations for "Flood Plain Primary" and "Flood Plain Secondary" should be applied to affected properties as they are annexed to the City. Oil and gas production should be permitted in such zones under special restrictions which will assure that such economically vital development will offer a minimum obstruction to flood flow, will not cause peripheral flooding of other properties, will not materially impair the ability of the flood plain to discharge the waters resulting from a 100-year

flood, will either be resistant to flotation or immune to extensive damage flooding.

So long as flood waters may be carried within the river channel, the City should also encourage construction of additional levees by the Levee District to minimize inundation of areas during a 100-year flood.

Should additional levees be constructed in the future, the City should work with the Corps of Engineers to redesignate areas which would be inundated by the 100-year flood.

b. The City should continue to implement the Drainage System Plan to resolve local storm run-off problems. The existing plan appears in the Public Services and Facilities Element of the Bakersfield Metropolitan Area General Plan. The plan should be updated by the Public Works Department on a continual basis according to need.

Priority storm drainage improvements are to be listed within the City of Bakersfield Capital Improvement Program, which is to be updated annually.

c. The City should continue to participate in the National Flood Insurance Program to enable owners of property within flood prone areas to:

- acquire flood insurance;
- buy and sell such properties through loans regulated, guaranteed, or made by the Federal Government; and

- develop or rehabilitate their property in accordance with appropriate land use measures.

Once the City receives flood water surface elevation data from HUD, the City should determine the appropriate land use and development control measures to be implemented within flood prone areas.

## E. FIRE PROTECTION

The City of Bakersfield has enjoyed the reputation of having a superior fire protection system. At present eight (8) City fire stations protect the 32 square mile area within the City.

As evidence of the quality of fire protection, Bakersfield has a Class 2 fire insurance rating, which permits the City's property owners to generally pay less in fire insurance premiums than property owners in areas with lower classifications (3 through 10).

The basic issues of fire service planning in Bakersfield do not relate to "improving" the system by adding more fire stations, equipment, and manpower. Rather, the issues relate to modifying the existing fire protection system to gain more cost-effectiveness in fire protection, and to seek means of reducing the long-term costs of fire defenses while still providing adequate protection to citizens and property owners.

This section of the Safety Element attempts to give some guidance on how to seek an effective system of fire protection in a manner which is fiscally responsible. In part, it reflects the findings and recommendations of the Arthur D. Little, Inc. study entitled, Municipal Fire Organization, Manpower, and Facilities: Report to the City of Bakersfield, California. It focuses on approaches to modify the City's Fire Protection System within the context of physical and management planning.

### 1. Overlap of Fire Station Service Areas

Standards established by the insurance industry have historically been used as the basis for spacing fire stations. In 1973, the Insurance Services Office issued a new set of standards which indicated that the area served by a fire

station should be based on the "Fire Flow" requirement of a given area. "Fire Flow" means the amount of water which would have to be applied to a fire situation under the most adverse conditions.

In light of these revised "standards", and the generally low-density characteristics of much of Bakersfield, many of the existing stations are spaced too close to one another. If fire stations were spaced further apart, fewer stations could serve a much larger area.

In addition to the overlap of the City's stations, substantial overlap exists between City and County stations. If consolidation and/or automatic response arrangements of the City and County Fire Departments were to occur, it would be possible to eliminate unneeded stations and also create a more efficient fire protection system.

If, for instance, the City of Bakersfield were given the responsibility of providing fire protection to all portions of the Greater Bakersfield area south of the Kern River at least three existing County Fire Stations could be eliminated; the City would operate two of the existing fire stations (see Illustration III). Also, the City would not have to make additional investments to construct and operate new stations to serve growing areas of the City.

The economic benefits of a program to relocate or eliminate stations which are improperly located can be substantial. It costs about $250,000 to construct a new fire station; however, it costs about $500,000 each year to operate a fire station.

KERN COUNTY BOARD OF TRADE

MAP OF
METROPOLITAN
**BAKERSFIELD**

OILDALE

KERN RIVER

KERN RIVER

STOCKDALE

KERN CITY

California State College of Bakersfield

N

ILLUSTRATION III
**Fire Stations**

- City Fire Station
- Planned City Fire Station
- County Fire Station
- Possible Overlapping County Fire Stations

A fire station location model has been developed by the Public Technology Institute which is capable of utilizing computer technology to identify the best locations for fire stations based upon existing and anticipated future patterns of development. However, the application of such a model without the cooperation and participation of the County toward ultimate solutions to the problem of overlap may be a meaningless exercise.

2. Water Systems and Sprinkler Protection

Water is a critical component of a community's fire protection system. As a measure of its importance "water supply" accounts for 39% of the relative values considered by the Insurance Service Office which conducts studies to determine recommended fire insurance ratings. The relative importance given to water supply in the rating is equal to that given to the Fire Department.

The City of Bakersfield is principally served by two water companies which operate as public utilities. Kern Island Water Company generally serves the southwest part of the city. California Water Service Company serves the bulk of the remaining incorporated area. These water companies have generally provided water flows more than adequate to meet the fire flow requirements established by the Insurance Services Office. The water companies have attempted to upgrade their systems with modern pumps and storage facilities, replacement of undersized mains, and interconnections within the systems.

New water flow requirements were recently adopted by the Public Utilities Commission of the State of California. The

standards are to be applicable to new connections or developed areas. These standards are as follows:

| LAND USE | Minimum Flow |
|---|---|
| 1. Rural, residential with a lot density of two or less per acre primarily for recreational and retirement use. | 250 gpm |
| 2. Lot density of less than one single-family residential unit per acre. | 500 gpm |
| 3. Lot density of one or two single-family residential units per acre. | 750 gpm |
| 4. Lot density of three or more single-family residential units per acre. | 1,000 gpm |
| 5. Duplex residential units, neighborhood business of one story. | 1,500 gpm |
| 6. Multiple residential one and two stories; light commercial or light industrial. | 2,000 gpm |
| 7. Multiple residential, three stories or higher; heavy commercial or heavy industrial. | 2,500 gpm |

These standards may be unreasonable, depending upon the manner in which they are interpreted. They may be costly to achieve, especially if any portion of the existing system must be modified to provide required fire flows to new development, and may not result in better fire protection, if the existing ISO standards are adequate. It may be appropriate for the City to consider being the purveyor of water in newly developing areas since the City would not be subject to these PUC standards.

The most widespread approach of applying water to

fires is the use of hose streams by Fire Department forces. A more effective approach is to install automatic sprinkler systems. Nationally, automatic sprinkler systems have historically suppressed 96.8% of fires in buildings where they are installed.

The most significant factor about sprinkler protection is that if they were broadly used, for example installed within all or nearly all commercial and industrial uses within a community, the demand for City fire protection forces would be substantially reduced; fire stations could be located much farther apart, contain much less equipment, and be manned by much fewer personnel. As such, the long-term program for improving fire protection should be to stimulate the extensive use of automatic sprinkler protection in all commercial uses in the downtown area, particularly in any buildings improved or developed as a result of Redevelopment activity; requiring installation of sprinkler systems in new commercial and industrial uses over a certain size; and providing low-interest loans to be selectively used to stimulate the installation of sprinkler systems in existing buildings.

3. Street Design

Ask a firefighter what kind of street design is best from the standpoint of fire protection and he will usually respond the "grid"pattern. Grid streets allow the free movement of emergency equipment within neighborhoods from any direction and are easily memorized by fire service personnel.

Although they allow free movement by fire trucks, they also permit an inordinate amount of traffic through neighborhoods, which detracts from a desirable residential environment. Modern concepts of neighborhood design generally encourage the use of curvilinear street patterns and cul-de-sacs. Fire departments can compensate for the difficulty in memorizing street patterns in residential areas by frequent street drills; such memory exercises are a common aspect of on-going training activities. However, fire departments cannot effectively compensate for modern street patterns which are inadequately designed for the movement of relatively large fire protection equipment.

The City of Bakersfield's standards and specifications for street design have been prepared with the movement of emergency vehicles in mind. The minimum width of residential streets is 36 feet from curb to curb; the radius at the circular end of a cul-de-sac must be at least 40 feet to curb. No changes are proposed to the existing standards and specifications. Care should be taken to provide water facilities in cul-de-sacs.

Of equal importance is the design of arterial streets with median islands separating directional lanes of traffic. Breaks in divider islands should be provided to enable adequate access by emergency equipment.

4. Building and Site Design

The Uniform Building Code and Title 19 of the California Administrative Code specify the type of setbacks, type of construction, exiting, fire separations and similar struc-

tural requirements to assure that buildings are relatively safe from fire.

Secondly, the Fire Department currently reviews site plans as required by the adopted Fire Code, for the purpose of assuring an adequate level of protection. Plans are evaluated and requirements are set forth to assure that building complexes, including subdivisions, may be adequately protected.

Fire Department staff may include additional requirements should a particular site plan warrant such requirements in order to assure adequate protection.

5. Recommendations

a. The City Council should take steps to eliminate the overlap of fire station service areas. The first step should be to obtain the commitment of participation of the County Fire Department in ultimate solutions. The next step should be the analysis of existing fire station locations and the development of a plan for relocation and/or deletion of selected stations. The final step would involve determining means of implementing the plan and action.

b. The City Council should institute a program to stimulate the extensive use of automatic sprinkler protection systems. Such a program should involve:

- require the installation of sprinkler protection where redevelopment activity would occur.
- adoption of an ordinance requiring sprinkler protection in commercial and industrial uses of over a cer-

tain size and/or height; and

- where possible; initiate a program for the provision of low-interest loans for the purposes of encouraging the installation of automatic sprinkler protection in selected existing buildings.

c. Streets should continue to be designed in such a manner that the movement of fire control equipment is not unduly impaired. Special attention should be given to the design of cul-de-sacs and divided arterials.

d. The Fire Department should continue to review site plans and set forth necessary requirements as conditions for approval.

F. EMERGENCY PLAN

The City of Bakersfield has prepared and adopted an Emergency Plan. This plan was prepared in accordance with the California Emergency Act in cooperation with the Kern County Office of Emergency Services. The Emergency Plan is to serve as a guide for the coordination of emergency preparedness and operations before, during, and after a "War Emergency" or "Major Peacetime Emergency."

1. Summary of the Emergency Plan

Activation of Emergency Plan occurs in the event of any of the following:

a. Automatically by the existence of a State of War Emergency as defined by the California Emergency Services Act.

b. When the Governor has proclaimed a State of Emergency in an area including this City.

c. On the order of the City Council or the Director of Emergency Services, provided that the existence or threatened existence of a local emergency has been procalimed in accordance with the provisions of the Emergency Services Ordinance of this City.

The Emergency Plan requires close coordination between the operating City departments; Kern County; and other local, state and Federal agencies in delivering essential emergency services.

Essential elements of emergency services dealt with by the Emergency Plan include the following:

a. Coordinating Center for:

- direction and control
- public information
- communications
- transportation and evacuation

b. Welfare/shelter
c. Medical/health
d. Law enforcement
e. Traffic control
f. Engineering
g. Fire/rescue

2. Recommendations

The City should continuously be prepared for major wartime and peacetime emergencies by keeping the Bakersfield Emergency Plan up-to-date and conducting periodic drills to assure that the plan will work effectively if it is ever needed.

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